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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,639	08/18/2003	Farrokh Abrishamkar	020611	4435
23696	7590	07/11/2005	EXAMINER	
Qualcomm Incorporated Patents Department 5775 Morehouse Drive San Diego, CA 92121-1714			MEHRA, INDER P	
			ART UNIT	PAPER NUMBER
			2666	

DATE MAILED: 07/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/643,639

Applicant(s)

ABRISHAMKAR ET AL.

Examiner

Inder P. Mehra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-14 and 17-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,6,7,9-14,17,18 and 20-22 is/are rejected.
- 7) ☒ Claim(s) 8 and 19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This office action is in response to application filed on 4/13/05. Claims 1-22 are pending. Out of 1-22 pending claims, claims 4-5 and 15-16 have been cancelled, and claims 1-2, 6, 9-10, 12-13, 17, and 20-22 have been amended.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-3, 11-14 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by

Parvathanathan, Subahmanya et al (WO03/015364), hereinafter, '364.

For claims 1, 12 and 22, '364 discloses, in reference to fig. 1, in a wireless communication system a method for estimating an original pilot signal, the method comprising:

- receiving a CDMA signal,(refer to paragraph 1002, At the receiver unit, a rake receiver is often used to recover the transmitted pilot, signaling, and traffic data, refer to paragraph 1004).
- obtaining a pilot signal from the CDMA signal, refer to paragraph 1003; and
- estimating an original pilot signal using a pilot estimator having a first and second filters (*Paragraph 1063- FIG. 4A is a diagram of an embodiment of a pilot filter 236b, which is capable of implementing the second adaptive pilot filtering scheme*

depicting filters 1 and 2); and a switching component, *(selector, fig. 4A)*; each of the first and second filters generating from the pilot signal a filter estimate (y_n) and prediction error(e_n), *(provide pilot symbols, 'yn' and to filter the pilot symbols in an 'adaptive' manner (switching, selecting filters, fig. 4A) —, refer to paragraph 1007)*, and wherein the switching component applies a combining coefficient to each of the filter estimates based on the filter estimate's prediction error, and combines the filter estimates to produce a pilot estimate *(refer to controller 160 in figs. 4A, 4B, paragraph 1069, the filters may be programmable to achieve different responses. For example, different sets of coefficients may be provided for the filters, e.g., based on control signals from controller 160: This programmability feature would allow the filters to be dynamically adjusted to match varied channel conditions)*

For claim 11, '364 discloses, "where the method is implemented in a mobile station", refer to Paragraph 1003 lines 1-2 (terminal), and fig. 1.

For claims 2 and 13, '364 discloses, "wherein the first and second filters each includes a Kalman filter" *(Examples of adaptive filters include least mean square (LMS) filter, recursive least square (RLS) filter, Kalman filter, and so on, '364 discloses in fig. 4A filter 1 (412a) and filter2 (412b), further, discloses adaptive filters which include Kalman filters, "filter the pilot symbols in an 'adaptive' manner (switching) to provide an improved estimate of the response of the communication channel via which the signal was received, refer to paragraph 1007,*

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estimator 434 may implement a filter of any type and order, as is known in the art, refer to paragraph 1066).

For claims 3 and 14, '364 discloses, "wherein the Kalman filters are implementing Infinite Impulse Response filters", (Adaptive and non-adaptive filters may be implemented using an infinite impulse response (IIR) filter, (1064) Each filter 412 may be implemented as a FIR filter, *an IIR filter*, or some other filter structure, and is further associated with a respective response. Adaptive filters can track changes in the wireless channel based on statistics derived from the filter inputs, refer to abstract).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 6-7 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Parvathanathan, Subahmanya et al**, hereinafter, '364, as above, and further, in view of **K. Sam Shanmugan** (XP-002254352, Channel Estimation for 3G Wideband CDMA Systems Using the Kalman Filtering Algorithm), hereinafter, Sam.

For claims 6-7 and 17-18, '364 discloses all the limitations of the subject matter, including the following limitations:

- wherein the switching component uses a first error variance to compute the coefficient to apply to the first filter estimate and a Second error variance to compute the combining coefficient to apply to the second filter estimate , **as in claims 6 and 17, (the pilot symbols are initially filtered using a bank of two or more filters having different responses (or bandwidths). *Prediction errors are then computed for each filter, and the filter that minimizes the prediction errors is selected for use, refer to paragraph 1053, different sets of coefficients may be provided for the filters, e.g., based on control signals from controller 160, paragraph 1069.***
- wherein the pilot estimate, **as in claims 7 and 18,** is obtained according to the following: $S_{sub\ k}.MSE = a_{sub\ 1} S_{sub\ k}(0) + a_{sub\ 2} S_{sub\ k}(0_{sub\ 2})$

where

$S_{sub\ k}.MSE$ is the pilot estimate,

-----is the second filtered estimate,(refer to Eq (6) in paragraph 1050 and Eq (7) in paragraph 1053).

with the exception of the following limitations, (however, '364 discloses, "Examples of adaptive filters which include least mean square (LMS) filter, recursive least square (RLS) filter, Kalman filter, and so on, ***filter the pilot symbols*** in an '*adaptive*' manner (*switching*) to provide an improved estimate of the response of the communication channel via which the signal was received, refer to paragraph 1007, ***estimator 434 may implement a filter of any type and order, as is known in the art, refer to paragraph 1066***):

- Kalman filter, as recited by claims 4 and 15;

Sam discloses Kalman filter, (Channel estimates and system performance can be

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improved by using either an interpolation scheme or a Kalman filter based on a random process model for the fading in the communication channel, refer to Introduction and paragraph entitled “2. IMPROVED ESTIMATION PROCEDURE”, and abstract.

It would have been obvious to a person of ordinary skill in the art to combine the capability of using KALMAN Filter. This capability can be combined in pilot estimator at Mobile station. The suggestion or motivation to do so would be to provide accurate estimation of underlying channel characteristics.

6. Claims 9-10 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Parvathanathan, Subahmanya et al**, hereinafter, ‘364, as above, and further, in view of **Massicotte et al** (US 2004/0136444), hereinafter, ‘444.

For claims 9-10 and 20-21, ‘364 discloses all the limitations of subject matter, as above, with the exception of the following limitation, which are disclosed by ‘444:

- wherein the switching component uses a soft- switching method (or for an MMSE estimate, specification page 14, paragraph 1060), (Other algorithms proposed are the ZF (Zero Forcing) algorithm and the MMSE (Minimum Mean Square Error) algorithm which require the exact impulse response of all the users channels, refer to paragraph 0026 on page 2);
- wherein the switching component uses 3a hard- switching method (or MAP-estimate, refer to specification, page 14, paragraph 1061), refer to “the Maximum a-posteriori (MAP) algorithm”, page 2 paragraph 0025 for symbol-by-symbol detection.

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It would have been obvious to a person of ordinary skill in the art to combine the capability of using hard and soft switching methods, as disclosed by '444.. This capability can be combined in pilot estimator at Mobile station. The suggestion or motivation to do so would be to provide accurate estimation of underlying channel characteristics.

Allowable Subject Matter

7. Claims 8 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments filed 4/13/2005 have been fully considered but they are not persuasive.

Applicant argues, "however, in contrast to applicant's approach, the prediction errors are not used to compute coefficients that are applied to the filtered pilot signals. Instead, the prediction errors are used to select the filtered pilot signals. Instead, the prediction errors are used to select the filtered pilot signal with the best performance. The selected filtered pilot signal is not weighted, nor is it combined with any other filtered pilot signals. The selected filtered pilot signal is used, without modification, for the estimated pilot signal.

Applicant maintains that "Parvathansthan does not apply a coefficient to any filtered pilot signals, nor does it combine these signals in any way..

Further. Applicant argues that none of these references either alone or in combination, disclose a switching component that “applies a combining coefficient to each of the filter estimates as a function of its respective prediction error and combines the filter estimates to produce a pilot estimate”.

Each filter 412 receives and filters the pilot symbols, x_n , based on its filter response and provides filtered pilot symbols, y_{kn} . In an embodiment, each filter 412 further computes the prediction errors, e_{kn} , between the received pilot symbols and the filtered pilot symbols, and further derives the prediction error estimates, E_{kn} , as described above.

In response, it is stated that Parvathanathan discloses, with reference to figs. 3, 4a and 4b, refer to “Each filter 412 receives and filters the pilot symbols, x_n , based on its filter response and provides filtered pilot symbols, y_{kn} . In an embodiment, each filter 412 further computes the prediction errors, e_{kn} , between the received pilot symbols and the filtered pilot symbols, and further derives the prediction error estimates, E_{kn} , as described above”, refer to paragraph 1064; identifies the filter having the best performance. Each filter 412 may alternatively be designed to receive the Select signal and provide the filtered pilot symbols only when directed by the Select signal, refer to paragraph 1066. For example, different sets of coefficients may be provided for the filters, e.g., based on control signals from controller 160: This programmability feature would allow the filters to be dynamically adjusted to match varied channel conditions, refer to paragraph 1070.

In light of above explanations, arguments by the applicant are not persuasive.

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9. Applicant's amendment to claims 1-2, 6, 9, 12-13, 17, and 20-22 necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Inder P. Mehra whose telephone number is 571-272-3170. The examiner can normally be reached on Monday through Friday from 8AM to 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on 571-272-3174. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Inder Pal Mehra
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Examiner
Art Unit 2666
6/30/05



DANIGTON
PRIMARY EXAMINER